HYBRID REPAIR IS AN EFFECTIVE STRATEGY FOR REPAIR OF KOMMERELL DIVERTICULUM IN THE MODERN ERA

To the Editor:

The article by Tsukui and colleagues,[1] which is based on their experience of 4 cases, makes a provocative argument in favor of total arch replacement as a reasonable option for the surgical treatment of Kommerell diverticulum. Although we concur with Tsukui and colleagues[1] that there is no consensus regarding the optimal surgical strategy for repair of Kommerell diverticulum, we believe that the type of intervention can be tailored to the anatomy, comorbidities, and surgical expertise. There is an increasing role for hybrid repair in treating this pathologic entity. In our experience with 10 patients with Kommerell diverticula treated with a hybrid approach, we have demonstrated safety and effectiveness with a less invasive alternative for treating this pathology. Our techniques use stent grafts in combination with open surgery aided by the use of modern imaging.[2]

We were surprised to see that 2 of the patients in the series of Tsukui and colleagues[1] with maximum aortic diameters of only 20 and 25 mm also had a presentation of dysphagia. It has been our practice to observe smaller Kommerell diverticula such as these, because there is often another cause for the dysphagia.

Prophylactic repair to address the risk of rupture or dissection has been recommended for aneurysmal sizes larger than 3 cm; however, the morphology of Kommerell diverticula is complex and often asymmetric.[3] Our method of measuring the Kommerell diverticulum consists of taking measurements in 2 dimensions, orthogonal to the course of the aorta. The first measurement is taken at a level near the origin of the aberrant subclavian artery from the arch, and in this plane a diameter of at least 3 cm is considered an indication to operate. The second is taken across the cross-sectional diameter from the opposite aortic wall to the tip of the Kommerell diverticulum. When this measurement exceeds 5 cm, we recommend prophylactic repair.[2]

We also wondered why the patients all had unusually long stays in the hospital, including a stay of 291 days.[1] In our experience, with the use of a hybrid technique to avoid the additional thoracotomy, the mean stay was 8.7 ± 4 days.

We agree with Tsukui and colleagues[1] about the need for definitive treatment to include division of the ligamentum. With our method, however, this can be achieved with 1 incision instead of 2.[2]

We commend Tsukui and colleagues[1] for their article, and we suggest that options for repair of Kommerell diverticulum may safely include hybrid techniques.

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Reply to the Editor:

We thank Keshavamurthy and colleagues for their letter regarding our article. We also read with interest their group's article, "Hybrid Repair of Kommerell Diverticulum," recently published in *The Journal of Thoracic and Cardiovascular Surgery*.[1] They used stent-grafts in combination with open surgery aided by imaging.

Our series included 2 patients with a relatively small aortic diameter. Patient 4, a 38-year-old man, had Kommerell diverticulum with a diameter of only 25 mm; however, he had dysphagia, and preoperative esophagography showed esophageal stenosis (Figure 1, *A*). Postoperative esophagography showed improvement of the esophageal stenosis consequent to complete release of the vascular ring (Figure 1, *B*). We believe that even if the diameter of a Kommerell diverticulum is small, 2 of the mechanisms hypothesized by Backer, "sling-like effect" and "bowstring effect," create tracheal and esophageal compression. For prophylactic repair to prevent rupture or dissection, the size of the Kommerell diverticulum should be considered as an indication, and the measurement methods by the Cleveland clinic group may be appropriate. If the patient has dysphagia, however, there is an indication to operate even in cases with small diameter.

One of our patients had a long period of hospitalization. He was 72 years old when he had surgery and had a complex medical history, including myocardial infarction, renal insufficiency, and colon cancer. In addition to postoperative respiratory failure, he had rhabdomyolysis in response to medication for dyslipidemia. The combination of these conditions resulted in prolonged hospitalization. This kind of

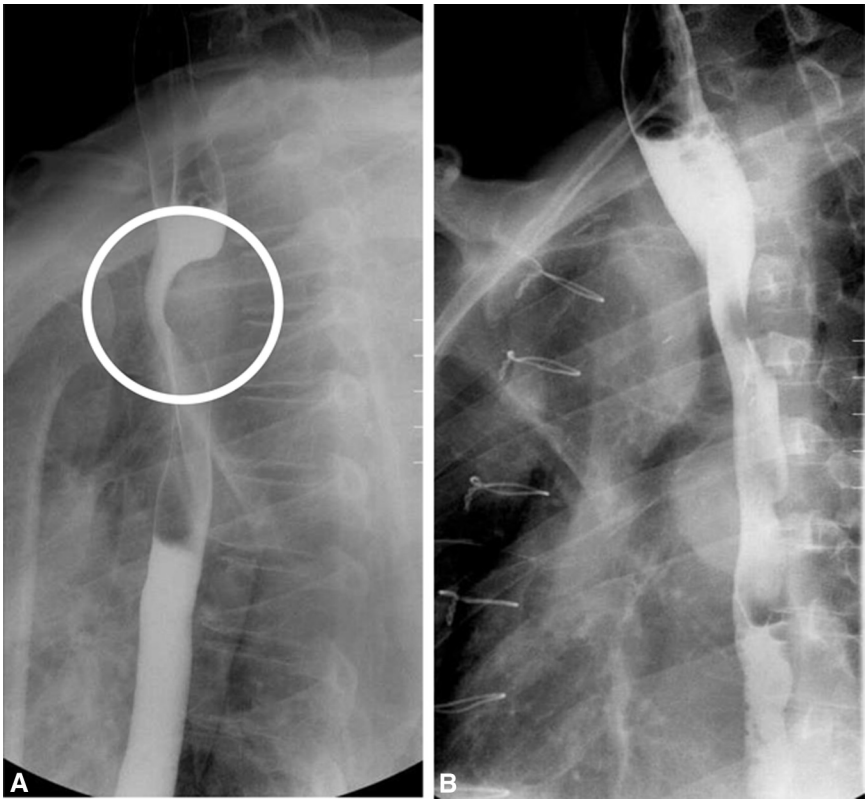

FIGURE 1. A, Preoperative esophagography shows esophageal stenosis caused by a Kommerell diverticulum. B, Postoperative esophagography shows improvement of the esophageal stenosis.

frail, elderly patient is a good candidate for hybrid repair. We plan to use both treatments for Kommerell diverticulum, according to the patient's condition.

Endovascular repair is a reasonable treatment for Kommerell diverticulum in frail patients; however, the long-term results are still unknown. Also, there is a risk of aortoesophageal fistula after endovascular repair. It is a rare complication, but it has been reported at an incidence of 1.5% to 1.9% and can be a devastating.[2-4]

Finally, we appreciate the commentary of Keshavamurthy and colleagues and plan to report the late outcomes of our technique in the future.

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ROSS OPERATION OR AORTIC VALVE REPAIR IN NEONATES AND INFANTS?

To the Editor:

We read with interest the recent article by Brancaccio and colleagues[1] that described 55 children younger than 18 years who underwent Ross procedures from 1993 to 2012. Thirteen patients were younger than 1 year, including 4 neonates (7%) and 9 infants (16%). In-hospital mortality was 13% (7/55), including 3 neonates and 3 infants, thus, bringing mortality in these age subgroups to 75% (3/4) and 33% (3/9), respectively. Brancaccio and colleagues[1] mentioned that 2 of those neonates with critical aortic valve stenosis underwent urgent Ross procedures for severe aortic insufficiency after balloon valvuloplasty, and this played major role in increasing mortality. Some comments appear to be appropriate in a view of the high mortality after the Ross procedure in neonates and infants.

We have recently reported our experience[2] with 100 children younger than 18 years who underwent the Ross procedure from 1995 to 2012. Nineteen patients were younger than 1 year, including 6 neonates and 13 infants. In-hospital mortality was 6%, including 4 neonates and 2 infants, thus bringing mortality in these age subgroups to 67% (4/6) and 15% (2/13), respectively. Similarly, we also observed that children younger than 1 year had a higher mortality.

Currently, we try to avoid Ross procedures in neonates and infants. We recently reported our strategy in performing aortic valve repair, with subsequent reoperative aortic valve repair if necessary, to delay the Ross procedure until the child is past infancy.[2-5] Aortic valve repair allows us to delay the valve replacement while preserving the ventricular function. The number of aortic valve repairs in our institution has increased